

## **Production and Environmental Quality of Tall Fescue Pastures: Cattle Performance and Production during First 18 Months**

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### **Background**

The negative impact of *Neotyphodium coenophialum* infection of tall fescue on cattle production is well known. Data are also becoming available to show that cattle grazing endophyte-infected tall fescue with a fungal strain selected to reduce toxic ergot alkaloid production do not exhibit serious animal health disorders. Further, recent evidence suggests that the ecological impacts of the endophytic association of *Neotyphodium* with tall fescue extend far beyond the relationships with cattle consumption and subsequent performance. Soil organic C and N concentration under high levels of wildtype-infected tall fescue was found to be greater than under low levels of wildtype-infected tall fescue in paired pastures that were 8 and 15 years old (Franzluebbers et al., 1999). With an estimated 14 Mha of tall fescue in the USA, mature stands of tall fescue with the wildtype endophyte could possibly be sequestering an additional 25 Tg of soil organic C than if stands were endophyte free. The effect of novel endophyte infection on soil organic C accumulation remains unknown. Combined with poultry litter application to pastures, a potential exists in tall fescue pastures for significant quantities of endocrine disruptors to be released into the pasture environment to affect cattle performance, as well as beyond the pasture should significant water runoff occur.

### **Objective**

The objective of this report was to summarize cattle performance and productivity during the first 18 months of grazing by yearling heifers on 'Jesup' tall fescue. Overall, this replicated water-catchment study integrates multiple objectives, including:

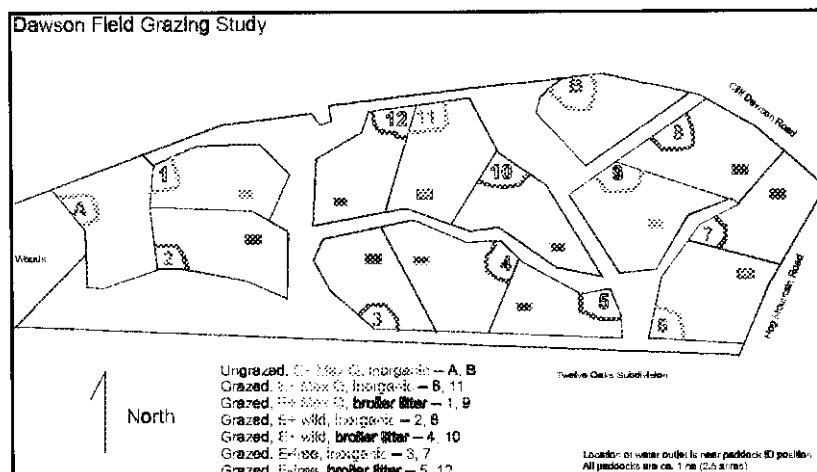
- ☐ cattle performance and production

- ☐ tall fescue persistence
- ☐ gastrointestinal parasite control
- ☐ soil organic C sequestration
- ☐ soil quality
- ☐ water quality

## Results

Cattle performance (ADG, average daily gain) and production (LWG, live-weight gain)

were affected by source of tall fescue (EF is endophyte-free, EQ is endophyte-infected 'Max Q', and EW is endophyte-infected wild-type) during 2002 and 2003. These responses were not the same during all evaluation periods. The lack of differences in ADG and LWG between EW and other treatments in Nov/Dec 2002 and Jun/Jul/Aug 2003 suggest periods of relief from toxic effects. Unlike a few other studies, in which no difference has been reported, ADG was statistically greater under EQ than EF during 287 days of grazing. Various environmental quality responses continue to be collected and will be evaluated together with these performance/production responses.



| Time period        | Performance (ADG, kg · d <sup>-1</sup> ) |       |        |     | Production (LWG, kg · ha <sup>-1</sup> ) |       |       |     |
|--------------------|--|-------|--------|-----|--|-------|-------|-----|
|                    | EF                                       | EQ    | EW     | LSD | EF                                       | EQ    | EW    | LSD |
| 11 Apr-9 May 2002  | 1.0                                      | < 1.2 | >> 0.7 | 0.3 | 135                                      | < 196 | > 127 | 77  |
| 9 May-30 May 2002  | 1.1                                      | 1.1   | 0.8    | 0.3 | 129                                      | 103   | 114   | 35  |
| 1 Oct-29 Oct 2002  | 0.3                                      | 0.3   | > 0.1  | 0.2 | 43                                       | 47    | > 20  | 29  |
| 29 Oct-26 Nov 2002 | 0.4                                      | 0.6   | 0.4    | 0.5 | 38                                       | 49    | 34    | 45  |
| 26 Nov-10 Dec 2002 | 0.9                                      | 1.2   | 0.9    | 0.6 | 25                                       | 33    | 26    | 16  |
| 13 Mar-10 Apr 2003 | 1.4                                      | < 1.7 | >> 1.2 | 0.3 | 142                                      | 168   | > 122 | 35  |
| 10 Apr-8 May 2003  | 1.3                                      | 1.3   | > 1.0  | 0.4 | 141                                      | 124   | 103   | 42  |
| 8 May-5 Jun 2003   | 0.9                                      | 0.9   | >> 0.4 | 0.1 | 96                                       | 86    | >> 43 | 21  |
| 5 Jun-3 Jul 2003   | 0.6                                      | 0.6   | 0.6    | 0.2 | 54                                       | 59    | 71    | 32  |
| 3 Jul-31 Jul 2003  | 0.2                                      | 0.3   | 0.4    | 0.2 | 18                                       | 22    | 39    | 23  |
| 31 Jul-28 Aug 2003 | 0.4                                      | 0.5   | 0.3    | 0.3 | 37                                       | 41    | 42    | 34  |
| 28 Aug-25 Sep 2003 | —  | —     | —      | —   | —  | —     | —     | —   |
| Mean ADG / sum LWG | 0.8                                      | < 0.9 | >> 0.6 | 0.1 | 856                                      | 929   | > 741 | 145 |

LSD is least significant difference among means at  $p = 0.05$ .

< and << or > and >> indicate significance between means at  $p < 0.1$  and  $p < 0.01$ .